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Wall turbulence under the influence of Langmuir supercells in shallow water BING-QING DENG, ANQING XUAN, LIAN SHEN, Univ of Minnesota - Twin Cities — Langmuir circulations generated by the interaction between surface water waves and wind-driven shear turbulence are pairs of counter-rotating vortices approximately aligned along the wind direction. In shallow water, Langmuir circulations are also called Langmuir supercells, because they can engulf the whole water column and interact with the bottom boundary layer. We performed wall-resolved large-eddy simulations of Langmuir turbulence in shallow water based on the C-L equations at different Reynolds numbers (Re), turbulent Langmuir numbers (La_t), and surface wave numbers (kh) for a comprehensive analysis of the impact of Langmuir supercells on turbulence in the bottom boundary layer. The mean velocity and Reynolds stresses are investigated to show the effects of the non-dimensional parameters (Re, La_t, and kh). The budgets of Reynolds stresses are analyzed to elucidate the interaction between Langmuir supercells and other residual turbulent motions.

Bing-Qing Deng
Univ of Minnesota - Twin Cities

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